Market states, expectations, sentiment and momentum: How naive are investors?

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MARKET STATES, EXPECTATIONS, SENTIMENT AND MOMENTUM: HOW NAIVE ARE INVESTORS?

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Abstract

Following Cooper et al (CGH) 2004 we test whether market states are relevant for predicting UK momentum profits. However, rather than simply categorising up/down markets based on actual prices as CGH, we suggest investors may view expectations and/or sentiment as important. Contrary to the findings for the US, we find that momentum returns are not related to CGH-defined market states. Similar findings hold for an expectations-based split. In contrast, for the whole sample period, construction and retail sentiment indicators explain differences in momentum profits. However, robustness tests suggest their explanatory power is driven by the post-subprime crisis period.

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1. INTRODUCTION

Following the seminal work of Jegadeesh and Titman (henceforth JT) (1993), considerable attention has been devoted both to the identification of momentum profits and to explanations as to why such profits may exist. JT (1993) demonstrate that stock returns exhibit momentum over medium horizons, such that a zero investment strategy involving shorting past recent (six-month) losers and buying past recent (six-month) winners generates excess returns of the order of 1% per month in the following six-month period. Subsequent work has demonstrated similar findings over a range of markets, with extensive evidence of momentum over short-to-medium horizons, ranging from 3 to 12 months.[1] The evidence suggests that momentum abnormal returns are now a stylized fact and cannot be attributed to data mining. As a result, several papers have sought to explain the existence of momentum returns either arguing that such returns are a compensation for risk (see, for example, Conrad and Kaul, 1998) or by using a behavioural model based on inherent biases on the part of some investors (see, for example, Daniel et al, 1998; Barberis et al, 1998; Hong and Stein, 1999).

In this paper we concentrate on the behavioural approach to explaining momentum profits, since recent evidence is more consistent with this view (see for example JT, 2001; Hvidkjaer, 2006; Asem, 2009; Chui et al, 2010) and in particular on one important aspect of the recent literature which argues that momentum profits are related to the prior state of the market. Specifically, consideration will be given to the approach adopted by Cooper et al (2004, hereafter CGH), which examines whether the profitability of momentum strategies differs depending on whether the market as a

[1] For example, Rouwenhorst (1998) finds similar results to JT (1993) for 12 European countries over the period 1980 to 1995; Hart et al (2003) find similar results to JT in examining 32 emerging markets; Griffin et al (2003) examine 40 markets including the US and find that macroeconomic risks do not explain findings; Galariotis et al (2007) find similar evidence for the UK stock market; Chui et al (2010) consider the role of cross cultural differences in momentum profits and find momentum profits in 37 of the 41 countries included in their sample; Gupta et al. (2010) using data for 51 countries and including more than 51,000 stocks find momentum profits using the conventional momentum strategy and using industrial and 52-week high momentum strategies; and Badreddine et al (2012) find that while transactions costs are important, once these are taken into account even for (highly liquid) UK optioned stocks, momentum profits persist for some strategies.

whole was ‘up’ or ‘down’ in the period prior to the momentum portfolio holding period. However, unlike CGH, we not only examine the extent to which momentum profits are affected by whether the market has gone up or down, but also whether it has gone up or down *relative to* expectations. In addition, contrary to the CGH arguments that momentum performance is conditional only on past market states, we further test whether investor sentiment is relevant by using a range of sentiment measures. Given the arguments that sentiment is highly relevant in financial markets (see, for example, Shleifer and Summers, 1990; Barberis et al, 1998; Barber et al, 2009) this is an important consideration for this most robust of anomalies.

CGH draw on the behavioural theories of Daniel et al (1998) and Hong and Stein (1999) to argue that there will be greater short-run momentum following market increases than following market decreases. The empirical evidence presented by CGH supports their argument, with short-run momentum profits exclusively following up-markets over the period 1929-1995 for the US market.[2] Thus they argue “consistent with Daniel et al (1998) and Hong and Stein (1999), the state of the market is critically important to the profitability of momentum strategies” (CGH, 2004, p1347). More specifically, they argue that as in Daniel et al (1998), aggregate overconfidence will be greater following an up-market, and that if, as supported by Hong and Stein (1999), decreasing risk aversion leads to greater momentum profits, then, if risk aversion and wealth are inversely related, momentum profits will be higher following an up-market than following a down-market. The state of the market has also been shown to be of importance in other areas. For example, Rosen (2006) argues that investors may be overly optimistic in ‘hot markets’. He provides evidence of merger momentum and shows that bidder stock prices have a greater tendency to increase when the stock market is doing better: “mergers announced during hot stock markets tend to get a better reaction from the

[2] Results are presented for mean returns, a CAPM model and a Fama-French 3 factor (FF3F) model. The main results presented in the paper are based on the state of the market in the three-year period prior to holding the momentum portfolio. They also present results based on the state of the market over a one-year and a two-year period prior to holding the portfolio. The only case where there is evidence of momentum profits during a down-market is for the FF3F model using the one-year definition of the state of the market.

market than those announced in a cold market" (Rosen, 2006, p1013). Similarly, there is evidence of over-optimism in hot IPO markets (see, for example, Helwege and Liang, 1996) and Holmes et al (2013) find that herding is more evident during periods when returns are low, compared to periods when returns are high.

Thus, there is considerable evidence to support the view that the recent performance of the market affects the magnitude (or, indeed, existence) of profits in relation to various market phenomena. In light of this, the extent to which momentum profits are affected by market states is clearly worthy of investigation in a market other than the US. In this paper we examine the issue for the UK market.[3] However, the CGH classification of the previous market state as either an 'up-market' or a 'down-market' may not be the most appropriate method by which to analyse the issue of the impact of aggregate market overconfidence. The approach taken by CGH only compares the *actual* market price at the beginning of the holding period, time *t*, with the *actual* market price at an earlier date, *t-i*, where *i* takes on the value of 12, 24 or 36 months. If the market price at time *t* (MP_t) is greater than MP_{t-i}, then the market is said to be up. In contrast, if MP_t is less than MP_{t-i} then the market is said to be down.[4] However, expectations and anchoring play an important role in finance and, particularly, in the behavioural finance literature.[5] In a market in which investors are rewarded for risk-taking (whatever the return generating process) the *expectation* at time *t-i* is that MP_t will be greater than MP_{t-i}, i.e.

[3] The London Stock Exchange is chosen for analysis in this paper for a number of reasons. First, it is one of the largest exchanges in the world in terms of market capitalization, trading value and number of trades (see http://www.world-exchanges.org/statistics); second it is the most international of stock exchanges (see http://www.londoncapitalventures.com/) and; third, it is a market where momentum profits have been evident in a number of studies (see, for example, Liu et al (1999), Hon and Tonks (2003) and relevant references in footnote 1). Investigation of the issues for this market will be of interest to a wide range of investors, both domestic and overseas.

[4] CGH also consider the market state as a continuous variable and find a non-linear relationship exists. However, the results from the use of a continuous variable for market state show a positive relationship between momentum profits and lagged market returns.

[5] Anchoring refers to the tendency when making estimates to start at an initial value (the anchor point) and adjust away from that point. In many situations, different initial values lead to individuals making different final estimates. See Tversky and Kahneman (1974).

by investing in a risky portfolio a positive return will be earned.[6] Despite this, expectations have no role in the CGH approach: they simply compare *actual* prices at two points in time. Rather than comparing the actual market price at two points of time, from both a rational and a behavioural perspective it is more relevant to compare the *actual* market price at the beginning of the holding period, *t*, with the *expectation* at time *t-i* of what the market price will be at time *t*.

This view is consistent with the notion of disappointment aversion as proposed by Gul (1991). Disappointment aversion is based on the idea that individuals have a reference point which evolves endogenously. As Fielding and Stracca (2007) state "Reflecting the idea that pain is more urgent than pleasure, the disappointment related to *outcomes below expectations* is assumed (and normally found) to be stronger than the elation related to *outcomes exceeding expectations*." (p251, emphasis added).[7] If expectations are important, then a comparison should be made between MP_t and $E(MP_{t,t-i})$, where the latter is the value that the market price is expected to have at time *t*, with the expectation formed at time *t-i*. To illustrate why this distinction might be important, consider the following situation:

$$E(MP_{t,t-i}) > MP_t > MP_{t-i} \qquad (1)$$

Here the price at the beginning of the holding period is greater than the actual price at time *t-i*, but is less than the value expected at time *t-i* for MP at time *t*. In these circumstances, investors may view the market as being 'down' (relative to expectations) even though the price of the market has risen over the period *t-i* to *t*. Consequently, to the extent that the prior market state and associated aggregate market confidence affects momentum profits as suggested by CGH, it is possible that the up/down split they use may not be accurately capturing investors' *perceptions* of the market state. *A priori* it is not possible to determine whether changes in actual prices or deviations from expectations are more important. It is possible that investors are relatively naïve and

[6] This is consistent with the findings of CGH. In their sample more than 84% of periods are classified as UP using a 36 month lag and over 72% are UP when using a 12 month lag.

[7] Fielding and Stracca (2007) examine behavioural explanations of the equity premium puzzle and suggest that a combination of myopic loss aversion and disappointment aversion provide "an attractive explanation of the equity premium puzzle" (p252).

that the comparison of actual prices at times *t* and *t-i* may be more important than the comparison of MP_t and $E(MP_{t,t-i})$. However, it is equally the case that trading strategies may be based more on variations from expectations, in which case a comparison of the actual and expected prices would be more relevant. Ultimately, it is an empirical issue as to which, if any, comparison is more relevant, one of the central issues that this paper seeks to address.

In addition to the specific case of expected future values being of potential importance, it is also possible that more general measures of investor sentiment might impact on momentum profits. We, therefore, examine the relationship between sentiment and momentum profits in the UK market as a second central issue in the paper, using a range of sentiment measures.[8] It is, of course, difficult to measure market expectations and levels of overconfidence or sentiment for all values of *t*. In this paper we employ different approaches for determining aggregate expectations and market sentiment. First, we use a direct measure of market expectations, in the form of stock index futures prices. The price of a stock index future at time *t-i* provides a means by which a *market determined* expectation can be established for specific values of the index at time *t*. Thus, the futures price provides a direct measure of $E(MP_{t,t-i})$. The second approach does not provide us with a *direct* measure of $E(MP_{t,t-i})$, but rather seeks to measure changes in market sentiment at different points in time, since investors seem to believe in sentiment (Brown and Cliff, 2004) and sentiment is relevant to a range of other issues in financial markets (for example: asset pricing (Baker and Wurgler, 2006); the value effect (Frazzini and Lamont, 2008); feedback trading (Chau et al, 2011); herding (Blasco et al, 2012; and Philippas et al, 2013); stock returns (Spyrou, 2012); volatility (Sayim et al, 2013); and bond yields (Nayak, 2010)). Specifically, we utilise a range of data from the OECD and the European Commission's Directorate General for Economic and Financial Affairs (DGEFA) resulting from business and consumer surveys which are

[8] In a recent paper Antoniou et al (2013) examine the role of sentiment on momentum profits in the US market, based on arguments relating to cognitive dissonance and information diffusion. They find that momentum profits are only evident in the presence of optimism.

designed to elicit judgements and expectations about the state of the economy.[9] We are then able to obtain measures of changes in these indicators from time *t-i* to *t*. By utilising both futures data and confidence indicators, we are able to examine the role of aggregate expectations and (over)confidence and thus to answer the question of whether investors are naïve in relation to the impact of market states in explaining momentum profits. In other words we test whether the lagged market return is the only relevant type of conditioning information that is necessary for predicting momentum portfolio performance, as CGH claim; or whether expectations and sentiment are also important.

It is, of course, the case that stock index futures prices are not available for long periods ahead (say the one, two or three years used by CGH). However, they are available typically for periods up to 8 months prior to maturity.[10] It should be noted that the choice of period over which to examine market states is arbitrary, as CGH recognise. From a theoretical perspective, there is no reason to believe that 3 years is more relevant than say 6 months, in terms of capturing the state of the market.[11] Indeed, there are strong arguments for suggesting that shorter horizons are more appropriate. For example, Benartzi and Thaler (1995) argue that *myopic* loss aversion can play a central role in explaining the equity premium puzzle, arguing that agency problems make it likely that even pension funds and endowment funds will be characterised by myopia. Furthermore, Haigh and List (2005) find that traders from the Chicago Board of Trade exhibit behaviour consistent with myopic loss aversion; Froot et al (1992) demonstrate the impact of short-horizon speculators on informational inefficiency; and Chang et al (2000) argue that herding in South Korea and Taiwan may be the result of short-horizon investors. Similarly, Fang (2012) "investigates the aggregate investor preferences and beliefs of the US stock market by examining enduring puzzles in finance" (p 546) and

[9] Two indicators, those relating to Consumer Confidence and Industrial Confidence are from OECD and the other three indicators used are from the DGEFA.

[10] Frequently, stock index futures trade nine months prior to maturity. However, even in highly liquid markets the volume of trade for such contracts is relatively low and arguably the forward rate unbiasedness hypothesis is less likely to hold.

[11] As noted by CGH, the results of using a 1, 2 or 3 year horizon are broadly similar.

results are consistent with loss aversion at both monthly and yearly horizons. In addition, the availability bias, whereby individuals give greater weight to information which most easily comes to mind, is also consistent with shorter investment horizons.[12] Therefore, in investigating the impact of market states on momentum profits, we partition our sample to states by first examining the difference between MP_t and MP_{t-i} and between MP_t and $E(MP_{t,t-i})$ for values of *i* ranging from 2 to 8 months.[13] We then partition the sample based on the following five sentiment indicators: the consumer confidence indicator; the retail trade confidence indicator; the construction confidence indicator; the industrial confidence indicator; and the economic sentiment indicator.[14] By comparing actual prices, deviations of prices from expectations and market sentiment, important insights should be provided about the market and the attitude of market participants to actual prices, expectations and investor sentiment.

There is evidence that during crisis periods financial decisions are made differently. For example, according to Anand et al. (2010) institutions invest more in stocks that are more liquid and less risky during periods of market stress and Choe et al. (1999) find that during the 1997 Asian financial crisis herding and positive-feedback trading by foreign investors fell markedly. However, in contrast, Philippas et al (2013) find no impact of the subprime crisis in relation to herding. In order to examine if differences are evident in relation to the issues examined here, we undertake analysis both for a period including the subprime crisis (which began in 2007/8) and a truncated sample period excluding the crisis.

This paper, therefore, makes four contributions to the literature. First it proposes, and utilises, a comparison between the expected and actual market price in examining the

[12] See, for example, Massa and Simonov (2006) who examine the role of familiarity and find that availability impacts on the investment decisions of some investors.

[13] Moreover, these periods for market movements are more in line with the periods used for identifying the individual stocks to be held when forming a momentum portfolio.

[14] The economic sentiment indicator provided is a weighted composite indicator comprising the consumer confidence indicator (weight 20%), the retail trade confidence indicator (5%), the construction confidence indicator (5%), the industrial confidence indicator (40%) and the service confidence indicator (30%).

role of the state of the market. Second, it examines the impact of economy wide sentiment on momentum profits. Third, the paper undertakes an out-of-sample test of the role of the state of the market in explaining momentum profits, by analysing the issue for the UK market. Fourth, given our focus on behavioural explanations and in light of established arguments concerning frame dependence, we examine the extent to which the results vary when the subprime crisis period is excluded. The rest of the paper is organised as follows. The next section sets out the data and methodology used. Section 3 presents and discusses the results, which are checked for robustness in section 4. Finally, section 5 provides a summary and conclusion.

2. **DATA AND METHODOLOGY**

For the formation of momentum portfolios, we begin by employing all stocks listed on the London Stock Exchange between June 1984 and December 2009. All price data used are taken from DataStream Thomson Reuters. Consistent with previous studies, we exclude all penny shares with a price of less than £1 at the start of the holding period to minimise microstructure effects. We include companies that were delisted during the period so as to avoid survivorship bias and we simulate realistic *ex ante* scenarios to avoid look-ahead bias. We assume that all companies are active during the holding period until the actual delisting takes place, at which time rebalancing of the portfolio takes place. The total sample of stocks used is 8821 and the average number used each month is 5511. Stocks are sorted at time *t* based on their returns in the period *t-j* and split into equally weighted quintiles. We then form a momentum portfolio one month after *t*, with the portfolio consisting of a long (short) position in the time *t-j* to *t* winner (loser) portfolio, i.e. the highest (lowest) quintile, and hold the portfolio for *k* months.[15] Previous literature typically uses strategies ranging from 3 to 12 months, with most attention focused on 3 and 6 months. We restrict ourselves to two strategies, namely the 3*x*3 and 6*x*6 combinations. The first, allows us to examine one of the most

[15] In line with previous literature, a month is skipped between the ranking period and the start of the holding period to avoid factors which may induce negative serial correlation (see, for example, Jegadeesh and Titman, 1993, who skip a week). We skip a month as we are using monthly data.

profitable strategies in the seminal work of Jegadeesh and Titman (1993), and the latter, one of the most typical momentum strategies in the literature as suggested by Galariotis (2010).

For each holding period we calculate raw momentum portfolio returns (R_p) as well as risk adjusted returns considering market risk in the form of the capital asset pricing model (CAPM) and multifactor risk in the form of the Fama and French three-factor model (FF3F henceforth). In the CAPM specification the market factor proxy is based on the value weighted FT All Share Index and the 3-month t-bill rate proxies for the nominal risk free rate. Two additional factors constructed as in Fama and French (1996) are employed in the multifactor analysis: the return difference between portfolios of small and large capitalisation stocks (*SMB*); and the return difference between portfolios of high and low book-to-market ratio stocks (*HML*).

To ensure consistency throughout the sample period, we define the stock index future expiry day as time *t* and form momentum portfolios one month after the expiry date based on the performance of individual stocks in the period prior to *t*. To examine the impact of the market state we identify the prior state of the market at the beginning of each portfolio's testing period, based either on actual market prices at times *t* and *t-i* or on deviations between the actual market price at time *t* and its expected time *t* price, where the expectation was formed at time *t-i*.

As explained, stock index futures data is used to examine the role of expectations. Futures on stock indices were introduced in the UK in May 1984 and to allow collection of futures data with a sufficient history prior to expiry of the contract, we begin by having the first holding period commence one month after the expiry of the December 1984 contract. Our futures sample covers the period up to the expiry of the June 2009 contract. There are four contract expiry dates each year (March, June, September and December) and we form non-overlapping portfolios for the 3*x*3 and 6*x*6 strategies. We use the FTSE-100 stock index return between times *t* and *t-i* to determine the state of the market using actual prices and to examine the impact of expectations we use the difference between the FTSE-100 index price at time *t* and its futures price at time *t-i* for

the contract expiring at time *t*. In considering both actual prices and expectations, *i* takes on the values 2, 3, 4, 6 and 8 months. When actual prices are used, the approach utilised by CGH is employed. If $MP_t \geq MP_{t-i}$ then the market state is defined as UP. If $MP_t < MP_{t-i}$ then the market state is defined as DOWN. For comparing the actual and expected prices with the futures price at time *t-i*, we start by defining the market as being up relative to expectations (UPE) if $MP_t \geq E(MP_{t,t-i})$ and down relative to expectations (DOWNE) if $MP_t < E(MP_{t,t-i})$.[16]

To examine the role of sentiment changes in explaining momentum profits, we use the OECD and DGEFA data (from DataStream) resulting from business and consumer surveys concerning expectations about the state of the economy. The surveys are used to provide confidence or sentiment indicators on a monthly basis. We use the change in the indicator from time *t-i* to *t* to examine the impact of improving or declining confidence (or sentiment) on subsequent momentum profits. Since we focus on expectations and market states, we control for the subprime crisis period, due to its extreme nature and possible impact on results (the rationale is analytically explained in the relevant section). For robustness we repeat all tests by ending the sample in August 2007.[17]

3. RESULTS

The empirical analysis first considers momentum profits in up and down markets based on raw returns. Table 1 presents raw profits to the zero investment portfolio, with panel A showing results for the 'UP/UPE' market state and panel B the results for the 'DOWN/DOWNE' market state. The first two columns relate to the 3*x*3 strategy and the final two columns the 6*x*6 strategy. The first and third columns show profits for those cases where the sample is split based on the relationship between the actual price of the index at time *t* (MP_t) and the actual price at time *t-i* (MP_{t-i}). The second and fourth

[16] In the remainder of the paper we will use upper case UP/DOWN to relate to market states based on actual prices and UPE/DOWNE to relate to market states based on expectations. Lower case 'up' and 'down' will be used to refer in general to categories of market states.

[17] Given that there is not a precise date for the start of the crisis, we also repeat the analysis including the period up to August 2008. In the interests of brevity we compare in the text, where appropriate, the differences between the two sets of results, without presenting tables.

columns show profits for a sample split based on the relationship between the actual price of the index at time *t* (MP_t) and the value of the index at time *t* expected at time *t-i* ($EMP_{t,t-i}$). The first figure in each column relates to mean returns and the figure in square brackets to median returns.

INSERT TABLE 1 ABOUT HERE

Considering the first two columns of the table, momentum profits are consistently positive for the 3*x*3 strategy irrespective of whether the CGH approach or expectations are employed to define market states. Profits are significantly different from zero for all up market cases (panel A) and for all but one down market cases (when the sample split is based on *i*=6, panel B), contrary to the CGH findings of momentum losses. Following down market periods, the returns for momentum strategies in table 1 are positive and even higher than following up market periods.[18] For example, using actual market prices (the CGH basis for the up/down split) up market returns are economically significant and range from 1.91% per month to about 2.23% per month. However, the smallest return for down markets (2.36%) is larger than the highest one for up markets and the returns for down markets go as high as 3.69%.[19] This result is consistent with Griffin et al (2005) for the US market who use macroeconomic criteria for sample splits.

Results for splits based on expectations (UPE/DOWNE) show a similar pattern to those using the CGH (UP/DOWN) approach, however there are some differences between the two approaches. Specifically, when the median values are used, a pattern emerges for the returns based on expectations, which is not evident when actual prices are used. In particular, for UPE (DOWNE) markets the portfolio median returns are monotonically decreasing (increasing) as values of *i* move from 2 to 8 months. More specifically, in the first case they move from 2.39% to 1.90%, while in the latter case they change from

[18] CGH attribute losses following down markets to lower overconfidence and higher risk aversion, which is not consistent with the findings here.

[19] The results for median returns show a similar pattern, with down market returns being higher than up market returns for all values of *i*.

2.03% to 2.78%. Nonetheless, overall the results from using expectations are not noticeably different from those using actual prices.

Panel C provides tests of equality of the mean under the assumptions of equal variances.[20] For the 3x3 strategy, in all cases the null hypothesis that the mean profits in UP and DOWN markets are equal is not rejected, which, given the presence of momentum profits in both states, is not surprising. These results are in stark contrast to the findings of CGH, in that there is no evidence that momentum profits vary with the state of the market for the 3*x*3 strategy. The negative signs in panel C are contrary to expectations and may be the result of extreme market periods having a higher impact than more normal up and down periods. This will be investigated in section 4.

Results for the 6*x*6 strategy, reported in the third and fourth columns of table 1 are different to those for the 3*x*3 strategy. More specifically, in both panels A and B mean returns are overall positive but insignificant.[21] Panel C shows that there are very few significant differences: for the split based on MP_{t-i} there is evidence of a significant difference between returns in up and down markets in two cases based on the mean (when the sample split is based on *i*=4 and 6); when the split is based on expectations, there is only one case where the down market profits are significantly higher than those in the up market state using the mean profits (when the sample split is based on *i*=4).[22] In contrast to CGH, in all cases of significant differences the returns following down market states are higher than those following up markets.

[20]Tests of (i) the equality of mean returns assuming unequal variances and (ii) the equality of median returns, were also undertaken, but are not reported in the interests of brevity. In general, the findings from the three tests are qualitatively similar. Reference will be made in the text where there are qualitative differences.

[21] Exceptions in relation to significance relate to when the sample is split based on *i*=3 for both measures in panel A, and for *i*=8 for down markets in panel B for the CGH measure. The only negative coefficients are for *i*=6 in the up market.

[22] There are no significant differences in median returns or in mean returns when unequal variances are assumed.

Overall, the findings so far suggest that market states do not seem to have the impact on the performance of momentum portfolios predicted by CGH. Rather, on average momentum strategies are profitable irrespective of state. In this setting, where market states do not matter, the expectations-based (futures prices) approach for splitting up and down markets does not add significant explanatory power to that obtained by the CGH approach.[23]

INSERT TABLES 2 AND 3 ABOUT HERE

Results for momentum profits based on returns adjusted by the CAPM and the FF3F factors are shown in tables 2 and 3 respectively. The layout of the tables is the same as in table 1. Interestingly, the results in these tables are markedly different from those for raw returns, highlighting the importance of taking account of risk. For the 3*x*3 strategy, while there were statistically significant momentum profits in table 1 for raw returns, they become insignificant once market (table 2) or FF3F factor adjustments (table 3) are performed for both up and down market states.[24] While in down states there is a negative value (when the sample split is based on *i*=8) following the adjustments, it is insignificant. It should be noted, however, that CGH also find no evidence of significant profits at the 5% level for some of their strategies when CAPM and FF3F adjusted returns are used, while they also find that in most cases returns are positive. However, given the results in tables 2 and 3 it is not surprising that in panel C there is no case where the 3*x*3 strategy mean return is significantly different across market states. It seems again that momentum profits are unrelated to market states irrespective of whether one uses actual prices or the expectations-based measure, once risk is taken into account. Indeed, for the period examined, adjusting for risk leads to a lack of momentum profits following both up and down markets.

[23] However, the expectations-based approach remains as an alternative, arguably less naive, method, which may be more applicable in other markets.

[24] The only exceptions relate to significance at the 10% level for CAPM adjusted up market returns for *i*=2, 3 and 8 for the CGH measure and for *i*=8 for the expectations-based measure. However, not only is the statistical significance low, but economic significance is also low, especially when compared to table 1.

Turning to the 6*x*6 strategy in the final two columns of table 2, panel A, CAPM adjusted momentum delivers no statistically significant returns irrespective of market states using a measure based on either actual price changes or expectations. The difference here compared to table 1 is that in some cases momentum returns are negative albeit insignificant and in contrast to the arguments of CGH this holds for both the UP/UPE market and the DOWN/DOWNE market states. Looking at the same columns of table 3 however, where results for FF3F adjusted returns are presented, all momentum returns for both measures and states are, contrary to the arguments of CGH, positive and now with more cases that are statistically significant, especially for up markets. The up market results are also very significant economically, ranging from 5.3% to 13.48%. However, as in the case for raw returns, panel C of both tables 2 and 3, and for both the 3*x*3 and the 6*x*6 strategy show there are no significant differences in means across market states.[25] Taken together, results for tables 1, 2 and 3 demonstrate the importance of how returns are measured (raw, CAPM adjusted or FF3F adjusted) when considering the significance of momentum strategies. However, findings relating to the extent to which market states impact on momentum profits are largely unaffected by the measure of returns, since statistical differences across market states are an exception whichever measure of risk is used.

The results so far show that for raw returns the 3*x*3 strategy experiences statistically and economically significant returns for both up and down market periods, yet they are marginally higher for down markets. When risk adjustments are made the returns become insignificant, but are higher for up markets rather than down ones. The exact opposite holds for the 6*x*6 strategy where results are generally insignificant for raw returns, but become significant when multiple contemporaneous risk considerations are taken into account. Given the lack of significant differences across market states the CGH results and proposition appear to be sample-specific. Furthermore, the differences between splits based on actual prices and expectations are small, suggesting that using a more

[25] The only exception is for the 6*x*6 strategy when *i*=4, with mean returns being significantly different at the 10% level assuming equal variances. However, the differences in mean returns are insignificant when assuming unequal variances. Similarly, there are no significant differences between median returns.

sophisticated approach based on expectations adds little to our understanding of the impact of market state. However, while up versus down states based on prices (actual or expected) does not reveal differences in momentum profits, measures of sentiment may be important for momentum profits. We now turn to investigate this issue.

INSERT TABLES 4 AND 5 ABOUT HERE

Tables 4 and 5 exhibit the relationship of momentum profits and market states for the 3*x*3 strategy when the split into up or down market states is determined by business and consumer surveys.[26] Table 4 shows results for market adjusted returns and table 5 for FF3F adjusted returns. Columns two to five show results for splits based on five sentiment indicators: construction; retail; consumer; industrial; and a composite economic sentiment indicator respectively. For convenience and comparison purposes, the first column of each table presents again the results for the CGH split in tables 2 and 3 (for tables 4 and 5 respectively). The results for the two sets of adjusted returns are broadly similar. In table 4, as can be seen from column one, the CGH split led to positive returns in all cases, contrary to their arguments, yet statistically significant only for up market cases. For all five sentiment indicators, the values of momentum profits in up markets are all positive, and statistically significant in 40% of cases. There is one significant value for each of the sentiment and industrial factors, three for the retail factor, but for the construction factor split, which seems to be the most informative, profits are significant throughout. This is confirmed by the results for down markets in panel B of the same table, where no value is significant, yet, all the values relating to the construction factor are negative as expected. The other factors offer few negative values.

The results in table 5, column one relate to the FF3F factor adjusted returns and are all statistically insignificant yet positive for both down and up markets, except for *i*=8 for

[26] This part of the analysis concentrates on the 3*x*3 strategy, since the sample numbers for the 6*x*6 strategy are relatively low. In addition, given the results in tables 1-3 for the 3*x*3 strategy, if significant differences are found here for this strategy, this would provide strong support for the importance of sentiment.

DOWN. As regards the signs and significances, the results for panels A and B are generally in line with table 4. More specifically, all profits in up markets split on the basis of sentiment indicators from columns two to five are positive, but in many cases they are insignificantly different from zero. However, once again they are consistently statistically significant for construction (exception for split based on *i*=6). They are also significant for one (two) case(s) for the sentiment (retail) factor. The DOWN market values are consistently negative for construction, but insignificantly different from zero.

Panel C of tables 4 and 5 show that as far as the consumer, industrial and sentiment factors are concerned, the differences in profits between up and down markets are generally insignificant.[27] However, for construction and retail indicators the differences are significantly in two cases each, with differences having the sign predicted by the arguments of CGH. This pattern holds for both market adjusted and FF3F adjusted returns.[28] Furthermore, in both tables the differences between up and down momentum profits are of the expected sign for all (4 out of 5) values of *t-i* for the split based on the construction (retail) indicator.

Overall, tables 4 and 5 indicate that there are different patterns to momentum returns under different market states when those states are determined based on sentiment indicators. Generally, the two most relevant indicators appear to be the construction and the retail ones. Given the importance the media often gives these two measures as a barometer of economic activity, it is interesting that differences are seen when they are used as the basis for an up/down split.[29,30]

[27] There is one exception: using CAPM returns for the sentiment indicator for *i*=3.

[28] This pattern relates to the case of assuming equal variances (panel C). If unequal variances are assumed there are three significant differences for FF3F returns for the construction indicator. For results in tables 4 and 5 there are no significant differences when median returns are used.

[29] For example, an article in The Telegraph newspaper on 11th July 2012, refers to a letter from high profile business leaders in the construction industry marking "the start of a new campaign called "Creating Britain's Future", which is designed to highlight the importance of the sector. It claims every £1 invested in construction generates £2.84 in economic activity, and the assets built "are vital to keep the UK economy competitive".

4. ROBUSTNESS

The sample period analysed thus far includes the subprime crisis, which had different characteristics and a huge impact compared to any other crises since the great depression. Given the earlier findings regarding the role of risk and potentially the psychological biases that can be exacerbated during such an extreme period, this section excludes data post-August 2007.[31] Hence, the tests and analysis are repeated in this section up to August 2007 with five tables that correspond to the earlier ones, i.e. each table from 6 to 10 corresponds one-to-one to each table from 1 to 5.

INSERT TABLE 6 ABOUT HERE

In table 6, we can see that for the 3*x*3 strategy, when excluding the crisis period there is no real difference to the full sample period as far as panels A and C are concerned. The statistical significances are as in table 1, while the mean and median returns are close to the full sample ones. For example, the 2 month 3*x*3 strategy mean value in panel A of tables 1 and 6 is 0.0193 and 0.0194 respectively and both are significant at the 1% level. Where there seems to be an impact of the post-subprime crisis is on the mean returns of momentum portfolios during down markets (panel B). More specifically, when the crisis period is excluded the mean returns appear to be much lower yet positive, still contrary to the arguments of CGH. In the remaining panel, the null hypothesis that the mean profits in UP and DOWN markets are equal is never rejected as in table 1, in stark contrast to the findings of CGH that momentum profits vary with the state of the market. The results are similar for the expectations measure that we propose (yet with more

(http://www.telegraph.co.uk/finance/newsbysector/constructionandproperty/9393772/Construction-industry-calls-on-Government-to-boost-infrastructure.html)

[30] There is evidence that momentum profits may be due to the activities of individual investors (see, for example, Hvidkjaer, 2006; and Dorn et al, 2008). In contrast, futures prices are likely to capture the expectations of institutional investors. This may explain why expectations do not appear to impact on momentum profits, but sentiment does. The authors are grateful to an anonymous referee for suggesting this.

[31] We also perform the tests using data for an extra year up to August 2008 to see the impact of the key early stage of this crisis; we do not report the tables for reasons of brevity, but discuss the findings, where appropriate.

significant cases), i.e. when the market behaves worse than expected (DOWNE), the returns are lower than in table 1, but still positive.

As regards the 6*x*6 strategy, the results are similar to table 1, with the same returns being significant, and no clear difference between up and down markets with both measures of market prices (actual and expectations) used here.

INSERT TABLES 7 AND 8 ABOUT HERE

Results for momentum profits based on returns adjusted for movements in the market and the FF3F factors are shown in tables 7 (related to table 2) and 8 (related to table 3) respectively. For the 3*x*3 portfolio the results with both adjustments are similar to the full sample results for all panels except panel B, i.e. when following down market periods. In panel B, the mean and, to a lesser extent, the median risk adjusted returns appear much higher when the crisis is excluded, yet as before panel C shows no statistically significant differences between periods. In relation to the 6x6 strategy, they are overall insignificant as for the full sample, but have the sign anticipated by CGH following down markets once risk is adjusted by the CAPM in table 7 (with returns even lower when the crisis period is excluded both in terms of mean and median). However, the differences between up and down markets are as before (with one exception for *i*=4 for mean returns assuming equal variances) insignificant for both measures used here. As far as the FF3F adjusted returns are concerned in table 8, the risk adjusted results are consistent with the rest of our evidence and contrary to the CGH arguments. Specifically, they are positive following both up and down market periods irrespective of the method of splitting the sample used. Hence it is not surprising that there are no statistically significant differences in performance between up and down markets in panel C.

Overall in tables 7 and 8, consistent with the full sample results in tables 2 and 3, and contrary to CGH, risk adjusted returns between up and down market periods do not differ significantly. The same holds for our proposed expectations measure. Thus, the findings in tables 1-3, that momentum profits are insignificantly different across up and

down markets, and contrary to the findings for the US in CGH, are not the result of including the crisis period.

As a final robustness test of the expectations-based approach, we examine whether the extent to which expectations have or have not been met impacts on momentum profits.[32] Specifically, we exclude cases where the actual price is within 10% of the expected price and split the remaining sample into those cases where the price is (i) more than 10% higher than expected and (ii) more than 10% lower than expected. In all cases (for raw, CAPM adjusted and FF3F adjusted returns using both 3*x*3 and 6*x*6 strategies) there is no significant difference in momentum profits between the two groups at the 10% level of significance.

INSERT TABLES 9 AND 10 ABOUT HERE

Tables 9 and 10 correspond to tables 4 and 5 respectively and relate to the 3*x*3 strategy for the sample pre-September 2007. In table 9, as for table 4, in up markets the profits are economically and statistically significant in all cases when the split is based on the construction factor. In relation to the split based on the retail factor they are also significant in two cases, that is, when splitting markets based on the indicator's data over the last 2 months and the last quarter. Finally, profits for the split based on the sentiment factor are also significant in up markets when information for the split is based on the news of the last quarter. The results as far as up markets are concerned are, therefore, consistent with the full sample results, i.e. in up markets the construction indicator is the most relevant.

However, when looking at the down market split in the same table, the results are different to those in tables 4 and 5. For the sample period including the post-subprime crisis period, momentum profits were insignificant in all cases following down markets and negative (albeit insignificant) when the sample was split using the construction indicator. Furthermore, tables 4 and 5 suggest there are significant differences between

[32] We thank a referee for suggesting this robustness check. In the interests of brevity, results are not reported.

up and down markets, consistent with CGH. However, in tables 9 and 10 profits following down markets are positive in all cases (and significantly so in 11(7) cases using CAPM (FF3F) returns). Moreover, in tables 9 and 10 there are cases where profits following up markets are significantly higher than following down markets, as well as cases where the former are significantly lower than the latter. Thus, the evidence that up/down splits based on construction and retail indicators are important determinants of momentum profits appear to be driven by the post-subprime crisis period.[33]

Overall one can argue that the results of CGH are market specific, or at least that they do not hold for the UK, as their measure and the first expectations measure that we propose for splitting markets to up and down ones, do not seem to anticipate momentum performance. This is robust to both including and excluding the subprime crisis period. In general, following up market periods the construction sentiment indicator is better in anticipating momentum performance, but this does not hold true when the crisis period is excluded.

5. CONCLUSION

This paper examines the extent to which market states impact on momentum profits for the UK market. However, rather than simply categorising markets as in CGH as up or down based on a comparison of actual market prices, we suggest that sentiment and/or expectations are important in determining momentum performance. Hence, in examining the interaction of market states and momentum profits, a number of ways are used to determine whether the market is up or down. In addition to using the split suggested by CGH that compares the actual value of an index at two points in time, we also split the sample based on different measures of expectations and sentiment. First, we use index futures prices to obtain a market-determined measure of expectations, with an up market being defined as the case where the actual price at time *t* is higher than the futures price determined at time *t-i* for delivery at time *t* and the down market determined similarly. Second, we split the sample based on changes in five market sentiment indicators derived from business and consumer surveys. In addition, we not

[33] In relation to both tables 9 and 10, there are no cases where the median returns are different across market states.

only present results for raw returns, but also for returns adjusted for risk using the market and the Fama-French factors. Two strategies are considered, namely the 3*x*3 and the 6*x*6.

Results for the 3*x*3 strategy are contrary to the findings and arguments of CGH both including the most recent crisis period and excluding it. Momentum performance is statistically and economically significant in both up and down market states and if anything higher in the latter. When the subprime crisis period is excluded, momentum returns remain positive and mostly significant following both up and down markets, hence down states are not associated with losses, contrary to CGH. These results hold irrespective of whether the up/down split is based on actual prices or expectations. The findings from the risk adjustments show that the performance is related to risk. For the full sample period the raw significant momentum returns become insignificant once risk is considered. Exclusion of the subprime crisis period leads to the loss of significance being much more subtle, affecting only the CGH measure and not the expectations measure we propose here. The results for the 6*x*6 strategy are similar when including and when excluding the subprime crisis period, but they are again inconsistent with CGH, as market states do not affect momentum performance.

When considering the impact of up/down splits based on sentiment indicators, results are more meaningful as indicators can anticipate momentum performance in both up and down markets. However, the role of sentiment indicators is not evident when the post-subprime crisis period is excluded. Thus, the main findings of CGH for the US appear not to hold for the UK, whether splits are based on actual prices, expected prices or sentiment. Furthermore, the importance of considering the role of the subprime crisis is highlighted by the results presented here. The results in this paper are relevant to investors seeking to exploit momentum strategies based on market states and suggest that the results for the US may not hold in other markets.

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Table 1: Momentum Profits and Market States: Raw Returns

Lags (i)	*3 x 3*		*6 x 6*	
Panel A:	$MP_t>MP_{t-i}$ UP	$MP_t>EMP_{t,t-i}$ UPE	$MP_t>MP_{t-i}$ UP	$MP_t>EMP_{t,t-i}$ UPE
2 months	0.0193***	0.0212***	0.0755	0.0755
	[0.0203]	[0.0239]	[0.0353]	[0.0353]
3 months	0.0207***	0.0210***	0.0210***	0.0210**
	[0.0219]	[0.0226]	[0.0353]	[0.0359]
4 months	0.0223***	0.0218***	0.0009	0.0005
	[0.0219]	[0.0202]	[0.0184]	[0.0196]
6 months	0.0222***	0.0233***	-0.0006	-0.0019
	[0.0191]	[0.0193]	[0.0256]	[0.0256]
8 months	0.0196***	0.0179***	0.0966	0.0172
	[0.0202]	[0.0190]	[0.0332]	[0.0311]
Panel B:	$MP_t<MP_{t-1}$ DOWN	$MP_t<EMP_{t-1}$ DOWNE	$MP_t<MP_{t-1}$ DOWN	$MP_t<EMP_{t-1}$ DOWNE
2 months	0.0284***	0.0252**	0.0048	0.0048
	[0.0245]	[0.0203]	[0.0196]	[0.0196]
3 months	0.0268**	0.0259**	0.1083	0.1031
	[0.0240]	[0.0238]	[0.0156]	[0.0180]
4 months	0.0243*	0.0249**	0.1843	0.1417
	[0.0240]	[0.0240]	[0.0449]	[0.0410]
6 months	0.0236	0.0215	0.1578	0.1414
	[0.0249]	[0.0245]	[0.0449]	[0.0411]
8 months	0.0369**	0.0353***	0.0402***	0.1626
	[0.0264]	[0.0278]	[0.0411]	[0.0411]
Panel C:	Test for mean equality: (up-down) = 0			
2 months	-0.833	-0.368	0.855	0.855
3 months	-0.548	-0.442	-1.029	-0.982
4 months	-0.170	-0.281	-2.107**	-1.723*
6 months	-0.116	0.152	-1.764*	-1.633
8 months	-1.308	-1.385	0.501	-1.383

The table presents results on the raw returns of the zero cost investment portfolio for the period between December 1984 and December 2009. The first and third column show returns for those cases where the sample is split based on the relationship between the actual price of the index at time t (MP_t) and the actual price at time t-i (MP_{t-i}) for the 3x3 and 6x6 strategies, respectively. The second and fourth columns show returns for a sample split based on the relationship between the actual price of the index at time t (MP_t) and the value of the index at time t expected at time t-i ($EMP_{t,t-i}$) for the 3x3 and 6x6 strategies, respectively, where i = 2, 3, 4, 6, and 8. Panel A contains the results for UP/UPE market states, while panel B for DOWN/DOWNE market states. The first figure in each cell in panels A and B relates to mean returns and the figure in square brackets to median returns. Panel C provides results on the equality of the mean returns for the UP/UPE and DOWN/DOWNE market states assuming equal variances. * indicates significance at the 10 percent level; ** indicates significance at the 5 percent level; *** indicates significance at the 1 percent level.

Table 2: Momentum Profits and Market States: CAPM Returns

Lags (i)	*3 x 3*		*6 x 6*	
Panel A:	$MP_t > MP_{t-i}$ UP	$MP_t > EMP_{t,t-i}$ UPE	$MP_t > MP_{t-i}$ UP	$MP_t > EMP_{t,t-i}$ UPE
2 months	0.0108*	0.0089	-0.0463	-0.0463
	[0.0094]	[0.0083]	[0.0331]	[0.0331]
3 months	0.0092*	0.0088	0.0091	0.0091
	[0.0072]	[0.0065]	[0.0331]	[0.0373]
4 months	0.0077	0.0083	0.0295	0.0263
	[0.0088]	[0.0094]	[0.0466]	[0.0394]
6 months	0.0075	0.0063	0.0184	0.0182
	[0.0094]	[0.0091]	[0.0315]	[0.0315]
8 months	0.0098*	0.0109*	-0.0863	-0.0141
	[0.0094]	[0.0097]	[0.0179]	[0.0247]
Panel B:	$MP_t < MP_{t-1}$ DOWN	$MP_t < EMP_{t-1}$ DOWNE	$MP_t < MP_{t-1}$ DOWN	$MP_t < EMP_{t-1}$ DOWNE
2 months	0.0015	0.0048	0.0425	0.0425
	[0.0048]	[0.0079]	[0.0324]	[0.0324]
3 months	0.0032	0.0044	-0.0607	-0.0565
	[0.0100]	[0.0101]	[0.0324]	[0.0275]
4 months	0.0057	0.0051	-0.1332	-0.0888
	[0.0068]	[0.0054]	[-0.0210]	[-0.0059]
6 months	0.0064	0.0086	-0.0907	-0.0776
	[0.0051]	[0.0054]	[0.0275]	[0.0275]
8 months	-0.0077	-0.0051	0.0208	-0.1017
	[0.0023]	[0.0012]	[0.0032]	[-0.0059]
Panel C:	Test for mean equality: (up-down) = 0			
2 months	0.838	0.375	-1.042	-1.042
3 months	0.532	0.395	0.794	0.756
4 months	0.179	0.288	1.786*	1.344
6 months	0.095	-0.190	1.155	1.042
8 months	1.309	1.252	-0.944	1.162

The table presents results on the CAPM-adjusted returns of the zero cost investment portfolio for the period between December 1984 and December 2009. The first and third column show returns for those cases where the sample is split based on the relationship between the actual price of the index at time t (MP_t) and the actual price at time t-i (MP_{t-i}) for the 3x3 and 6x6 strategies, respectively. The second and fourth columns show returns for a sample split based on the relationship between the actual price of the index at time t (MP_t) and the value of the index at time t expected at time t-i ($EMP_{t,t-i}$) for the 3x3 and 6x6 strategies, respectively, where i = 2, 3, 4, 6, and 8. Panel A contains the results for UP/UPE market states, while panel B for DOWN/DOWNE market states. The first figure in each cell in panels A and B relates to mean returns and the figure in square brackets to median returns. Panel C provides results on the equality of the mean returns for the UP/UPE and DOWN/DOWNE market states assuming equal variances. * indicates significance at the 10 percent level; ** indicates significance at the 5 percent level; *** indicates significance at the 1 percent level.

Table 3: Momentum Profits and Market States: FF3F Returns

Lags (i)	*3 x 3*		*6 x 6*	
Panel A:	$MP_t > MP_{t-i}$ UP	$MP_t > EMP_{t,t-i}$ UPE	$MP_t > MP_{t-i}$ UP	$MP_t > EMP_{t,t-i}$ UPE
2 months	0.0070	0.0046	0.0785	0.0785
	[0.0055]	[0.0002]	[0.1067]	[0.1067]
3 months	0.0067	0.0063	0.1159***	0.1197***
	[0.0031]	[0.0011]	[0.1067]	[0.1094]
4 months	0.0053	0.0063	0.1307***	0.1348***
	[0.0057]	[0.0079]	[0.1123]	[0.1123]
6 months	0.0047	0.0036	0.1268***	0.1301***
	[0.0020]	[0.0025]	[0.1064]	[0.1096]
8 months	0.0048	0.0056	0.0530	0.1285***
	[0.0016]	[-0.0019]	[0.0970]	[0.1121]
Panel B:	$MP_t < MP_{t-1}$ DOWN	$MP_t < EMP_{t-1}$ DOWNE	$MP_t < MP_{t-1}$ DOWN	$MP_t < EMP_{t-1}$ DOWNE
2 months	0.0018	0.0053	0.1416***	0.1416***
	[0.0037]	[0.0064]	[0.1196]	[0.1196]
3 months	0.0018	0.0028	0.0722	0.0676
	[0.0044]	[0.0050]	[0.1571]	[0.1334]
4 months	0.0041	0.0027	0.0213	0.0392
	[0.0044]	[0.0029]	[0.1807]	[0.1239]
6 months	0.0046	0.0065	0.0457	0.0498
	[0.0064]	[0.0044]	[0.1807]	[0.1153]
8 months	-0.0079	-0.0060	0.1468***	0.0224
	[0.0007]	[0.0020]	[0.1523]	[0.1153]
Panel C:	Test for mean equality: (up-down) = 0			
2 months	0.475	-0.072	-0.817	-0.817
3 months	0.444	0.321	0.547	0.664
4 months	0.099	0.325	1.311	1.233
6 months	0.010	-0.249	0.944	0.962
8 months	0.970	0.928	-0.889	1.057

The table presents results on the Fama-French factors-adjusted returns of the zero cost investment portfolio for the period between December 1984 and December 2009. The first and third column show returns for those cases where the sample is split based on the relationship between the actual price of the index at time t (MP_t) and the actual price at time t-i (MP_{t-i}) for the 3x3 and 6x6 strategies, respectively, where i = 2, 3, 4, 6, and 8. The second and fourth columns show returns for a sample split based on the relationship between the actual price of the index at time t (MP_t) and the value of the index at time t expected at time t-i ($EMP_{t,t-i}$) for the 3x3 and 6x6 strategies, respectively. Panel A contains the results for UP/UPE market states, while panel B for DOWN/DOWNE market states. The first figure in each cell in panels A and B relates to mean returns and the figure in square brackets to median returns. Panel C provides results on the equality of the mean returns for the UP/UPE and DOWN/DOWNE market states assuming equal variances. * indicates significance at the 10 percent level; ** indicates significance at the 5 percent level; *** indicates significance at the 1 percent level.

Table 4: Momentum Profits and Investor Sentiment Market States: CAPM Returns

Lags (i)	*3 x 3*					
Panel A:	$MP_t > MP_{t-i}$ UP	Construction Up	Retail Up	Consumer Up	Industrial Up	Sentiment Up
2 months	0.0108*	0.0155**	0.0168**	0.0094	0.0117*	0.0102
	[0.0094]	[0.0142]	[0.0123]	[0.0099]	[0.0104]	[0.0107]
3 months	0.0092*	0.0149*	0.0181**	0.0065	0.0098	0.0142**
	[0.0072]	[0.0101]	[0.0138]	[0.0094]	[0.0101]	[0.0104]
4 months	0.0077	0.0148**	0.0111*	0.0053	0.0079	0.0059
	[0.0088]	[0.0106]	[0.0107]	[0.0088]	[0.0099]	[0.0091]
6 months	0.0075	0.0130*	0.0097	0.0004	0.0087	0.0100
	[0.0094]	[0.0107]	[0.0096]	[0.0063]	[0.0086]	[0.0097]
8 months	0.0098*	0.0144**	0.0066	-0.0009	0.0083	0.0067
	[0.0094]	[0.0106]	[0.0070]	[0.0044]	[0.0088]	[0.0086]
Panel B:	$MP_t < MP_{t-i}$ DOWN	Construction Down	Retail Down	Consumer Down	Industrial Down	Sentiment Down
2 months	0.0015	-0.0041	-0.0027	0.0045	0.0024	0.0048
	[0.0048]	[0.0044]	[0.0014]	[0.0048]	[0.0019]	[0.0030]
3 months	0.0032	-0.0014	-0.0027	0.0081	0.0047	-0.0027
	[0.0100]	[0.0042]	[0.0012]	[0.0051]	[0.0030]	[0.0027]
4 months	0.0057	-0.0020	0.0037	0.0095	0.0065	0.0088
	[0.0068]	[0.0030]	[0.0039]	[0.0057]	[0.0033]	[0.0054]
6 months	0.0064	-0.0026	0.0045	0.0141	0.0050	0.0037
	[0.0051]	[0.0019]	[0.0054]	[0.0128]	[0.0057]	[0.0033]
8 months	-0.0077	-0.0044	0.0075	0.0159	0.0055	0.0069
	[0.0023]	[0.0012]	[0.0081]	[0.0150]	[0.0054]	[0.0057]
Panel C:	Test for mean equality: (up-down) = 0					
2 months	0.838	1.817*	1.828*	0.450	0.858	0.446
3 months	0.532	1.520	1.948**	-0.152	0.472	1.746*
4 months	0.179	1.560	0.681	-0.386	0.131	-0.318
6 months	0.095	1.410	0.477	-1.255	0.352	0.572
8 months	1.309	1.716*	-0.085	-1.533	0.259	-0.021

This table presents results on the CAPM-adjusted returns of the zero cost investment portfolio for the period between December 1984 and December 2009. The first column shows returns for those cases where the sample is split based on the relationship between the actual price of the index at time t (MP_t) and the actual price at time t-i (MP_{t-i}) for the 3x3 strategy, where i = 2, 3, 4, 6, and 8. The remaining five columns exhibit returns for a sample split based on the relationship between the actual price of a sentiment-index at time t and the value of that index at time t-i for the 3x3strategy, where i = 2, 3, 4, 6, and 8. The sentiment indices used here are the Construction Confidence Index, the Consumer Confidence Index, the Industrial Confidence Index, the Retail Trade Confidence Index and the Economic Confidence Index obtained from OECD and DGEFA. Panel A contains the results for UP market states, while panel B for DOWN market states. The first figure in each cell in panels A and B relates to mean returns and the figure in square brackets to median returns. Panel C provides results on the equality of the mean returns for the UP and DOWN market states assuming equal variances. * indicates significance at the 10 percent level; ** indicates significance at the 5 percent level; *** indicates significance at the 1 percent level.

Table 5: Momentum Profits and Investor Sentiment Market States: FF3F Returns

Lags (i)	*3 x 3*					
Panel A:	$MP_t>MP_{t-i}$ UP	Construction Up	Retail Up	Consumer Up	Industrial Up	Sentiment Up
2 months	0.0070	0.0130*	0.0145**	0.0058	0.0081	0.0067
	[0.0055]	[0.0087]	[0.0106]	[0.0065]	[0.0079]	[0.0050]
3 months	0.0067	0.0128*	0.0151**	0.0037	0.0062	0.0106*
	[0.0031]	[0.0077]	[0.0113]	[0.0050]	[0.0079]	[0.0083]
4 months	0.0053	0.0131*	0.0072	0.0026	0.0049	0.0027
	[0.0057]	[0.0087]	[0.0079]	[0.0044]	[0.0079]	[0.0051]
6 months	0.0047	0.0106	0.0069	-0.0021	0.0056	0.0072
	[0.0020]	[0.0055]	[0.0064]	[0.0015]	[0.0038]	[0.0051]
8 months	0.0048	0.0117*	0.0030	-0.0024	0.0046	0.0031
	[0.0016]	[0.0077]	[0.0029]	[-0.0006]	[0.0029]	[0.0020]
Panel B:	$MP_t<MP_{t-i}$ DOWN	Construction Down	Retail Down	Consumer Down	Industrial Down	Sentiment Down
2 months	0.0018	-0.0059	-0.0047	0.0039	0.0017	0.0036
	[0.0037]	[-0.0019]	[-0.0033]	[0.0031]	[-0.0012]	[0.0031]
3 months	0.0018	-0.0036	-0.0041	0.0069	0.0041	-0.0031
	[0.0044]	[-0.0019]	[-0.0019]	[0.0037]	[0.0010]	[-0.0006]
4 months	0.0041	-0.0047	0.0030	0.0082	0.0054	0.0076
	[0.0044]	[-0.0038]	[0.0007]	[0.0060]	[0.0025]	[0.0043]
6 months	0.0046	-0.0044	0.0029	0.0126	0.0040	0.0024
	[0.0064]	[-0.0033]	[0.0031]	[0.0079]	[0.0050]	[0.0037]
8 months	-0.0079	-0.0058	0.0065	0.0133	0.0050	0.0064
	[0.0007]	[-0.0059]	[0.0055]	[0.0082]	[0.0078]	[0.0077]
Panel C:	Test for mean equality: (up-down) = 0					
2 months	0.475	1.788*	1.842*	0.183	0.599	0.258
3 months	0.444	1.560	1.833*	-0.292	0.204	1.485
4 months	0.099	1.691*	0.398	-0.528	-0.039	-0.511
6 months	0.010	1.389	0.374	-1.369	0.163	0.442
8 months	0.970	1.628	-0.323	-1.456	-0.044	-0.297

This table presents results on the Fama-French factors-adjusted returns of the zero cost investment portfolio for the period between December 1984 and December 2009. The first column shows returns for those cases where the sample is split based on the relationship between the actual price of the index at time t (MP_t) and the actual price at time t-i (MP_{t-i}) for the 3x3 strategy, where i = 2, 3, 4, 6, and 8. The remaining five columns exhibit returns for a sample split based on the relationship between the actual price of a sentiment-index at time t and the value of that index at time t-i for the 3x3strategy, where i = 2, 3, 4, 6, and 8. The sentiment indices used here are the Construction Confidence Index, the Consumer Confidence Index, the Industrial Confidence Index, the Retail Trade Confidence Index and the Economic Confidence Index obtained from OECD and DGEFA. Panel A contains the results for UP market states, while panel B for DOWN market states. The first figure in each cell in panels A and B relates to mean returns and the figure in square brackets to median returns. Panel C provides results on the equality of the mean returns for the UP and DOWN market states assuming equal variances. * indicates significance at the 10 percent level; ** indicates significance at the 5 percent level; *** indicates significance at the 1 percent level.

Table 6: Momentum Profits and Market States: Raw Returns (pre-2007 crisis)

Lags (i)	*3 x 3*		*6 x 6*	
Panel A:	$MP_t>MP_{t-i}$ UP	$MP_t>EMP_{t,t-i}$ UPE	$MP_t>MP_{t-i}$ UP	$MP_t>EMP_{t,t-i}$ UPE
2 months	0.0194***	0.0214***	0.0814	0.0814
	[0.0212]	[0.0240]	[0.0365]	[0.0365]
3 months	0.0210***	0.0213***	0.0217**	0.0217**
	[0.0233]	[0.0240]	[0.0359]	[0.0365]
4 months	0.0215***	0.0207***	0.0016	0.0140
	[0.0219]	[0.0202]	[0.0204]	[0.0255]
6 months	0.0226***	0.0238***	0.0001	-0.0013
	[0.0202]	[0.0212]	[0.0284]	[0.0284]
8 months	0.0200***	0.0182***	0.1063	0.0201
	[0.0226]	[0.0193]	[0.0359]	[0.0353]
Panel B:	$MP_t<MP_{t-1}$ DOWN	$MP_t<EMP_{t-1}$ DOWNE	$MP_t<MP_{t-1}$ DOWN	$MP_t<EMP_{t-1}$ DOWNE
2 months	0.0184*	0.0157*	-0.0077	-0.0077
	[0.0241]	[0.0173]	[0.0188]	[0.0188]
3 months	0.0152	0.0152*	0.1139	0.1077
	[0.0197]	[0.0156]	[0.0156]	[0.0180]
4 months	0.0130	0.0159	0.1993	0.1471
	[0.0240]	[0.0240]	[0.0411]	[0.0370]
6 months	0.0086	0.0077	0.1805	0.1573
	[0.0241]	[0.0240]	[0.0409]	[0.0391]
8 months	0.0205	0.0231**	0.0312**	0.1865
	[0.0240]	[0.0249]	[0.0410]	[0.0411]
Panel C:	Test for mean equality: (up-down) = 0			
2 months	0.0949	0.5651	0.9539	0.9539
3 months	0.5386	0.5900	0.9699	-0.9189
4 months	0.7665	0.4759	-2.0009*	-1.5884
6 months	1.2179	1.4525	-1.7409*	-1.5828
8 months	-0.0412	-0.4284	0.5531	-1.3496

See notes to table 1 as this table presents the same results as table 1 but for June 1984 - pre-September 2007 (i.e. excluding the crisis period).

Table 7: Momentum Profits and Market States: CAPM Returns (pre-2007 crisis)

Lags (i)	*3 x 3*		*6 x 6*	
Panel A:	$MP_t>MP_{t-i}$ UP	$MP_t>EMP_{t,t-i}$ UPE	$MP_t>MP_{t-i}$ UP	$MP_t>EMP_{t,t-i}$ UPE
2 months	0.0111*	0.0091	-0.0534	-0.0534
	[0.0091]	[0.0080]	[0.0299]	[0.0299]
3 months	0.0095	0.0090	0.0040	0.0037
	[0.0072]	[0.0065]	[0.0273]	[0.0299]
4 months	0.0090*	0.0099*	0.0252	0.0060
	[0.0088]	[0.0094]	[0.0373]	[0.0331]
6 months	0.0075	0.0063	0.0156	0.0152
	[0.0088]	[0.0086]	[0.0273]	[0.0273]
8 months	0.0100*	0.0112*	-0.0994	-0.0216
	[0.0088]	[0.0091]	[0.0026]	[0.0110]
Panel B:	$MP_t<MP_{t-1}$ DOWN	$MP_t<EMP_{t-1}$ DOWNE	$MP_t<MP_{t-1}$ DOWN	$MP_t<EMP_{t-1}$ DOWNE
2 months	0.0129	0.0155*	0.0441	0.0441
	[0.0057]	[0.0106]	[0.0275]	[0.0275]
3 months	0.0162	0.0164*	-0.0719	-0.0663
	[0.0104]	[0.0107]	[0.0324]	[0.0275]
4 months	0.0184	0.0153	-0.1563	-0.0998
	[0.0089]	[0.0068]	[-0.0210]	[-0.0059]
6 months	0.0230	0.0239*	-0.1219	-0.1016
	[0.0080]	[0.0089]	[0.0108]	[0.0108]
8 months	0.0107	0.0088	0.0163	-0.1357
	[0.0050]	[0.0044]	[-0.0210]	[-0.0134]
Panel C:	Test for mean equality: (up-down) = 0			
2 months	-0.1753	-0.6327	-1.0142	-1.0142
3 months	-0.6285	-0.7075	0.7707	0.7240
4 months	-0.8526	-0.5355	1.7646*	1.2650
6 months	-1.3455	-1.5917	1.2688	1.1173
8 months	-0.0567	0.2124	-0.8496	0.9002

See notes to table 2 as this table presents the same results as table 2 but for June 1984 - pre-September 2007 (i.e. excluding the crisis period).

Table 8: Momentum Profits and Market States: FF3F Returns (pre-2007 crisis)

Lags (i)	*3 x 3*		*6 x 6*	
Panel A:	$MP_t>MP_{t-i}$ UP	$MP_t>EMP_{t,t-i}$ UPE	$MP_t>MP_{t-i}$ UP	$MP_t>EMP_{t,t-i}$ UPE
2 months	0.0074	0.0049	0.0790	0.0790
	[0.0060]	[0.0011]	[0.1121]	[0.1121]
3 months	0.0066	0.0061	0.1233***	0.1278***
	[0.0031]	[0.0011]	[0.1123]	[0.1124]
4 months	0.0065	0.0078	0.1347***	0.1332***
	[0.0078]	[0.0084]	[0.1124]	[0.1124]
6 months	0.0050	0.0039	0.1308***	0.1346***
	[0.0078]	[0.0025]	[0.1096]	[0.1182]
8 months	0.0053	0.0062	0.0514	0.1345***
	[0.0016]	[-0.0019]	[0.1069]	[0.1124]
Panel B:	$MP_t<MP_{t-1}$ DOWN	$MP_t<EMP_{t-1}$ DOWNE	$MP_t<MP_{t-1}$ DOWN	$MP_t<EMP_{t-1}$ DOWNE
2 months	0.0099	0.0132	0.1650***	0.1650***
	[0.0037]	[0.0077]	[0.1334]	[0.1334]
3 months	0.0119	0.0122	0.0762	0.07070
	[0.0049]	[0.0060]	[0.1909]	[0.1807]
4 months	0.0128	0.0095	0.0290	0.0473
	[0.0029]	[0.0007]	[0.2011]	[0.1668]
6 months	0.0161	0.0172	0.0511	0.0553
	[0.0020]	[0.0044]	[0.2215]	[0.1909]
8 months	0.0040	0.0030	0.1877***	0.0220
	[0.0007]	[0.0020]	[0.2419]	[0.1523]
Panel C:	Test for mean equality: (up-down) = 0			
2 months	-0.2393	-0.8092	-0.9912	-0.9912
3 months	-0.4940	-0.5728	0.5286	0.6528
4 months	-0.5583	-0.1634	1.1153	1.0686
6 months	-0.9491	-1.1817	0.8022	0.8320
8 months	0.1026	0.2717	-1.0797	0.9528

See notes to table 3 as this table presents the same results as table 3 but for June 1984 - pre-September 2007 (i.e. excluding the crisis period).

Table 9: Momentum Profits and Investor Sentiment Market States: CAPM Returns (pre-2007 crisis)

Lags (i)	*3 x 3*					
Panel A:	$MP_t > MP_{t-i}$ UP	Construction Up	Retail Up	Consumer Up	Industrial Up	Sentiment Up
2 months	0.0111*	0.0185**	0.0195***	0.0093	0.0121	0.0105
	[0.0091]	[0.0145]	[0.0125]	[0.0094]	[0.0099]	[0.0104]
3 months	0.0095	0.0173**	0.0211**	0.0060	0.0101	0.0148**
	[0.0072]	[0.0101]	[0.0142]	[0.0086]	[0.0099]	[0.0101]
4 months	0.0090*	0.0171**	0.0119	0.0047	0.0096	0.0059
	[0.0088]	[0.0124]	[0.0106]	[0.0080]	[0.0099]	[0.0088]
6 months	0.0075	0.0148*	0.0099	-0.0002	0.0084	0.0103
	[0.0088]	[0.0106]	[0.0091]	[0.0053]	[0.0080]	[0.0094]
8 months	0.0100*	0.0143*	0.0064	-0.0015	0.0078	0.0061
	[0.0088]	[0.0099]	[0.0080]	[0.0033]	[0.0080]	[0.0072]
Panel B:	$MP_t < MP_{t-i}$ DOWN	Construction Down	Retail Down	Consumer Down	Industrial Down	Sentiment Down
2 months	0.0129	0.0038	0.0043	0.0145*	0.0113	0.0133*
	[0.0057]	[0.0050]	[0.0030]	[0.0059]	[0.0030]	[0.0039]
3 months	0.0162	0.0059	0.0039	0.0193**	0.0139	0.0060
	[0.0104]	[0.0057]	[0.0027]	[0.0120]	[0.0033]	[0.0030]
4 months	0.0184	0.0051	0.0120	0.0208**	0.0147	0.0179**
	[0.0089]	[0.0030]	[0.0044]	[0.0145]	[0.0033]	[0.0098]
6 months	0.0230	0.0064	0.0137**	0.0257***	0.0144	0.0130*
	[0.0080]	[0.0027]	[0.0065]	[0.0157]	[0.0112]	[0.0045]
8 months	0.0107	0.0070	0.0164**	0.0280***	0.0151	0.0170**
	[0.0050]	[0.0030]	[0.0098]	[0.0168]	[0.0112]	[0.0127]
Panel C:	Test for mean equality: (up-down) = 0					
2 months	-0.1753	1.3595	1.5292	-0.5163	0.0732	-0.3374
3 months	-0.6285	1.1189	1.7384*	-1.3156	-0.3715	1.0737
4 months	-0.8526	1.1953	-0.0492	-1.6066	-0.4986	-1.2454
6 months	-1.3455	0.8029	-0.3739	-2.6184**	-0.5719	-0.2611
8 months	-0.0567	0.7020	-0.9692	-3.0175***	-0.7129	-1.0745

See notes to table 4 as this table presents the same results as table 4 but for June 1984 - pre-September 2007 (i.e. excluding the crisis period).

Table 10: Momentum Profits and Investor Sentiment Market States: FF3F Returns (pre-2007 crisis)

Lags (i)	*3 x 3*					
Panel A:	MP_t>MP_{t-i} UP	Construction Up	Retail Up	Consumer Up	Industrial Up	Sentiment Up
2 months	0.0074	0.0156*	0.0168**	0.0057	0.0088	0.0074
	[0.0060]	[0.0099]	[0.0127]	[0.0065]	[0.0083]	[0.0065]
3 months	0.0066	0.0147*	0.0176**	0.0034	0.0067	0.0114*
	[0.0031]	[0.0078]	[0.0114]	[0.0051]	[0.0083]	[0.0087]
4 months	0.0065	0.0150*	0.0080	0.0021	0.0066	0.0030
	[0.0078]	[0.0113]	[0.0079]	[0.0038]	[0.0083]	[0.0064]
6 months	0.0050	0.0125	0.0074	-0.0023	0.0056	0.0078
	[0.0078]	[0.0078]	[0.0077]	[0.0015]	[0.0038]	[0.0064]
8 months	0.0053	0.0120	0.0031	-0.0026	0.0045	0.0030
	[0.0016]	[0.0078]	[0.0038]	[-0.0006]	[0.0020]	[0.0015]
Panel B:	MP_t<MP_{t-i} DOWN	Construction Down	Retail Down	Consumer Down	Industrial Down	Sentiment Down
2 months	0.0099	0.0000	0.0003	0.0113	0.0079	0.0095
	[0.0037]	[-0.0012]	[-0.0033]	[0.0031]	[-0.0012]	[0.0031]
3 months	0.0119	0.0018	0.0006	0.0150*	0.0107	0.0027
	[0.0049]	[-0.0019]	[-0.0019]	[0.0048]	[-0.0006]	[-0.0012]
4 months	0.0128	0.0000	0.0088	0.0166*	0.0110	0.0142*
	[0.0029]	[-0.0050]	[-0.0006]	[0.0069]	[-0.0006]	[0.0037]
6 months	0.0161	0.0011	0.0093	0.0210**	0.0108	0.0089
	[0.0020]	[-0.0048]	[0.0025]	[0.0079]	[0.0060]	[0.0031]
8 months	0.0040	0.0016	0.0129*	0.0220***	0.0120*	0.0137**
	[0.0007]	[-0.0056]	[0.0060]	[0.0082]	[0.0079]	[0.0078]
Panel C:	Test for mean equality: (up-down) = 0					
2 months	-0.2393	1.4241	1.6456	-0.5495	0.0880	-0.2481
3 months	-0.4940	1.2429	1.6846*	-1.1356	-0.3800	1.0520
4 months	-0.5583	1.4789	-0.1009	-1.4172	-0.4303	-1.1559
6 months	-0.9491	1.0871	-0.1866	-2.3015**	-0.4824	-0.1102
8 months	0.1026	0.9844	-0.9388	-2.4290**	-0.7249	-1.0377

See notes to table 5 as this table presents the same results as table 5 but for June 1984 - pre-September 2007 (i.e. excluding the crisis period).